E 215

A New, Exact, and most Expeditious

METHOD

Of Delineating all manner of

FORTIFICATIONS

(*Regular* and *Irregular*)

As well from the *INTERIOR*, as from the *EXTERIOR POLIGONE*;

Being comprehended within the Two *Faces* or *Superficies* of a

MEDALL.

1666.

LONDON, Printed in the Year 1667.

534 m - 28.

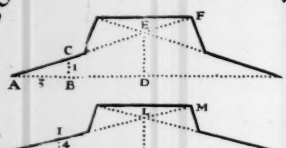
A PENTAGONO AD LINEAM RECTAM INTRORSVM.

AB. BC :: AD. DE
8. 9 :: DE. EF

GH. HI :: GK. KL
5. 7 :: KL. LM

PRO QVADRATO

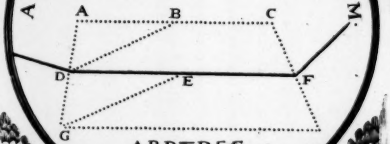
A



A QVADRATO AD LINEAM RECTAM

AB = BC
DE = EF

B

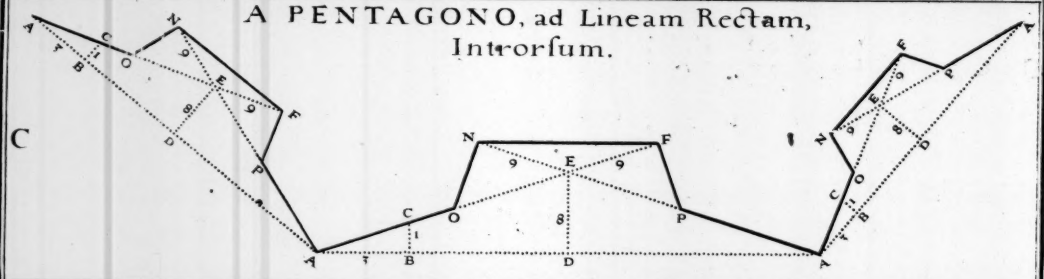


ABD = DEG

EXTRORSVM.

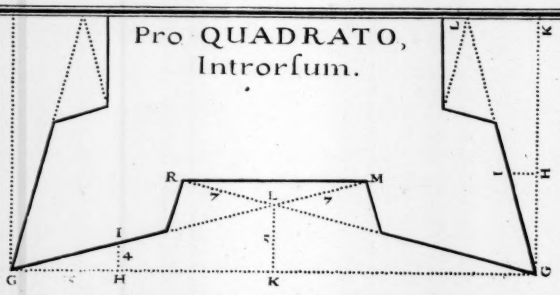
A PENTAGONO, ad Lineam Rectam, Introrsum.

C



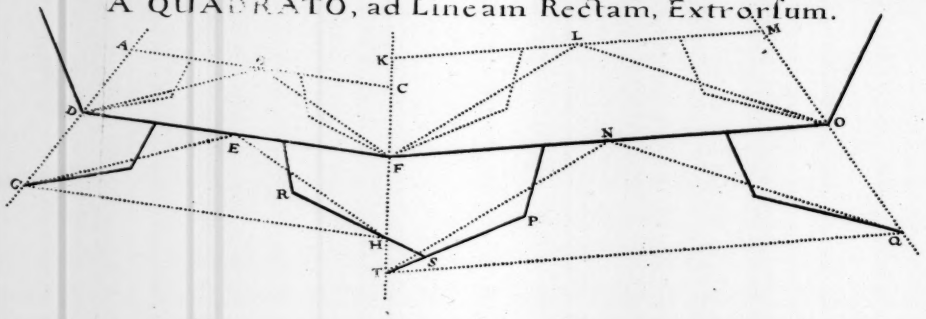
Pro QUADRATO, Introrsum.

D



A QUADRATO, ad Lineam Rectam, Extrorsum.

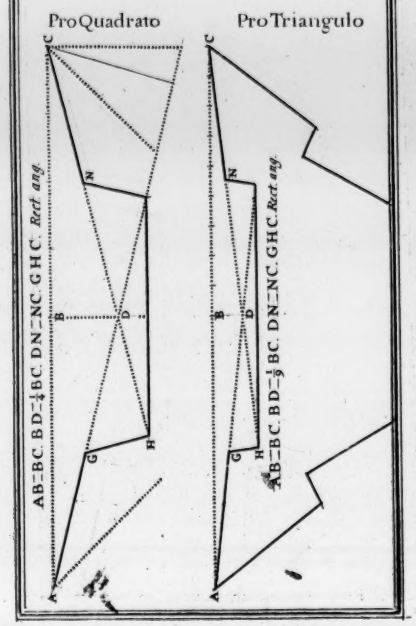
E



BRITISH MUSEUM

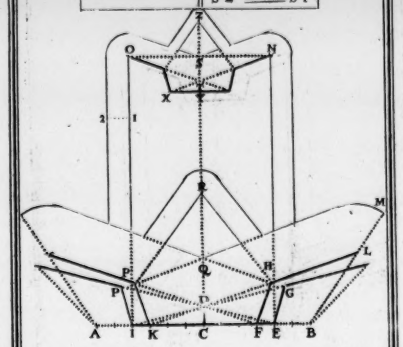
534.m 23
Fortificatio K

EXTRORSVM



INTRORSVM

A Quadrato et Pentagono ad Lineam Rectam		Pro Opere Coronato	
DC	$\frac{1}{12}$ AB	PO	KL
AI	$\frac{2}{12}$ AB	OS	SN
AK	$\frac{3}{12}$ AB	ST	$\frac{1}{3}$ SN
PKL	Rect: ang.	TV	VN
PIG	Rect: ang	VXO	Rect: ang.
		12	XV
		SZ	SY



Sir Samuel Morlands Fortification

EXTRORSVM

A Pentagono ad Lineam Rectam	Pro Rectionem et Operis Formam Aperit ad Lin. Rec.
AB ——— BC	BF ——— bE
BD ——— ½ BC	FI *Ductus refles G*
DG ——— GA	MF ——— LA
GHC *Rect ang*	NO ——— HC
AR ——— GH	QR ——— ½ QO
	RT ——— TP
	RS ——— SO
	TV ——— ½ TP
	VX ——— XP
	XYR *Rect ang*

INTRORSVM

(A)Bastion plein(B)Stillon(E)Orillon(D)Flanc bas(F)Flanc haut(G)Retranchement
(H)Fosse vers la ville(C I K)Triangle qui couure les Canons caches (F O)

CD ½ AB	
CE ½ CD	
AF ½ AB	
G F L *Rect ang*	

BRITISH MUSEUM

A New, Exact, and most Expeditious

METHOD

Of Delineating all manner of

FORTIFICATIONS

Regular and *Irregular*, (as well from the *Interior*, as from the *Exterior Poligon*;) being comprehended within the Two *Faces* or *Superficies* of A *MEDALL*. 1666.

The use of the First Face *or* Superficies *of the* MEDALL *as represented in Fig.* A.

THe first *Face* or *Superficies* of the *Medall* serves to delineate all manner of *Fortifications* from the *Base* or *Exterior Poligon*; And that

1. From a *Pentagon* to a *Right Line*, as being the more perfect
2. From a *Square* to a *Pentagon*, as being the less perfect

} Figures.

1. *From a* Pentagon *to a* Right Line.

Having divided the given *Base* or *Exterior Poligon* A A (as in *Fig.* C,) into two equal parts in the poynt D; from that poynt D erect a *Perpendicular* D E of a sufficient length. Then take any measure whatsoever, (be it a Chain, Pole, Staff, or Stake out of a Hedge) and mark out 3, or 6, or 9, or 12, or 15, or 18, or 21, or 24, or 27, or 30 Lengths upon the Line A D in the poynt B; from which raise a *Perpendicular* B C equal to $\frac{1}{3}$ of A B, so is C a *visual* poynt, through which is to be drawn the Line A F, cutting the *Perpendicular* D E in the poynt E; And E a *visual* poynt, through which is to be drawn the Line A N.

Which done, divide the *Perpendicular* D E into eight equal parts, and make either of the Lines E N and E F equal to nine of those parts. And then from the poynts N, and F, of the Lines A N and A F, let fall the *Perpendicular* N O, till it cutt the Line A F in the poynt O. And so likewise the *Perpendicular* F P, till it cutt the Line A N in the poynt P. Lastly, joyn the poynts A O N F P A, and so you have A O, and A P for the two *Faces*; N O, and F P for the two *Flancks*, and N F for the *Curtain* of that *Fortification*. And observing the same Method from all the *Bases*, the *Fortification* becomes entire, as in *Fig.* C.

From

2. *From a* Square *to a* Pentagon.

The Method of delineating from a *Square* to a *Pentagon*, is the very same with that from a *Pentagon* to a *Right Line*; Onely instead of marking out three Lengths upon the *Half-Base*, you are to mark out 15 for the Line G H. And instead of (1) you are to allow (4) for the *Perpendicular* H I. And lastly, instead of dividing the *Perpendicular* K L into eight parts, you are to divide it into five; and of those parts you are to sett off 7 both upon the Line L M, and upon the Line L R. And this is all the difference, as may be clearly seen in *Fig.* D.

The use of the Second Face *or* Superficies *of the* MEDALL *as represented in Fig.* B.

THe second *Face* or *Superficies* of this *Medall* directs how to delineate any *Fortification* by the *Interior Poligon*; And that from a *Square* to a *Right Line*:

For Example.

The *Interior Poligon* D F O being given (as in *Fig.* E) first draw the Capital Lines A G, K T, and M Q of a sufficient length. Then by the foregoing Directions, describe a *Fortification* inward upon this *Interior Poligon* (as though it were an *Exterior*;) Which done, continue the *Curtains*, and so you have given you the two Lines A C, and K M, which you are to divide equally in the points B, and L. And from those 2 Points to draw the four Lines B D, B F, L F, and L O: As likewise from the two poynts, E and N, you are to draw the four Lines E G, E H, N T, and N Q; so as E G, may be parallel to B D, E H to B F, N T to L F, and N Q to L O; Or (which is the very same thing) make the *Angle* D E G, equal to the *Angle* A B D; the *Angle* F E H, to the *Angle* C B F; the *Angle* F N T, to the *Angle* K L F; and the *Angle* O N Q, to the *Angle* M L O.

Lastly, from the four points of Intersection, *viz.* G, H, T, and Q, draw the Lines G H, and T Q, which are the two *Bases* sought; upon which, by the foregoing Method, describe a *Fortification* Inward, and the Work is done.

Onely whensoever the *Bases* (and consequently the two Faces of a *Bastion*) do not meet in a Poynt, (as very rarely they will!) the *Face* of the less *Half-Bastion* cutts off the *Face* of the greater *Half-Bastion*; which hath this good property among many other, that it often opens or enlarges the *Angle* of the *Bastion* very considerably. Thus in *Fig.* E, the *Face* R H cutts off the *Face* P T in the poynt S.

There is one thing observable in the Method both of the first and second *Face* of this *Medall*, which is this, That instead of taking three Lengths of any Measure for the Line A D, in *Fig.* C, and then setting off (1) for the *Perpendicular* B C, I might divide the *Half-Base* A D into 3 or 6, or 9 equal parts, and take $\frac{1}{3}$ thereof for the *Perpendicular* D E, Because the Line D E bears the same proportion to the Line A D, as the Line B C doth to the Line A B. So likewise, instead of taking 15 or 30 Lengths upon the *Half-Base* G K in *Fig.* D, for the Line G H, and setting off 4 or 8 of those parts in the *Perpendicular* H I, I might as well have divided the *Half-Base* G K into 15 or 30, and sett off 4 or 8 for K L. For as K L is to G K: so is H I to G H.

But forasmuch as this last way is more difficult and tedious than the other before mentioned, That was made use of, and This laid aside.

FINIS.

BRITISH MUSEUM

A

A PENTAGONO AD LINEAM RECTAM INTRORSVM.

AB. BC :: AD. DE
8 . 9 :: DE . EF

GH. HI :: GK . KL
5 . 7 :: KL . LM

PRO QVADRATO

B

A QVADRATO AD LINEAM RECTAM.

AB = BC
DE = EF

ABD = DEG

EXTRORSVM.

C

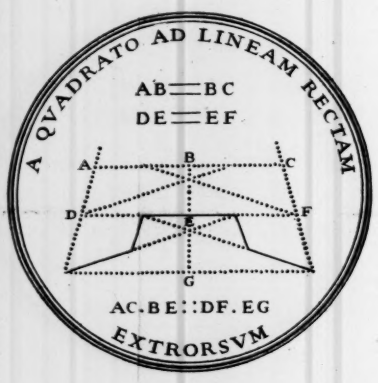
A PENTAGONO, ad Lineam Rectam, Introrſum.

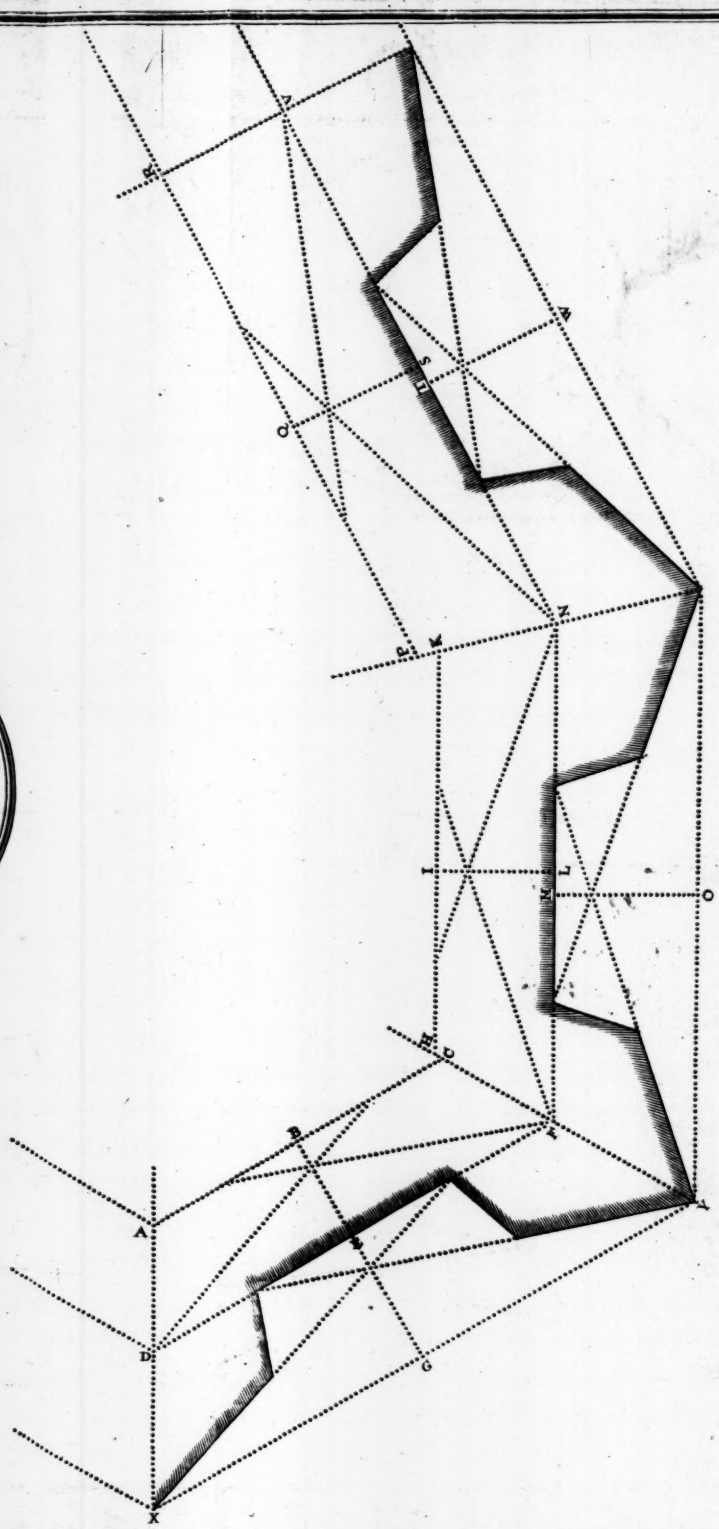
D

Pro QUADRATO, Introrſum.

E

A QUADRATO, ad Lineam Rectam, Extrorſum.





BRITISH MUSEUM

A SECOND METHOD
(*Not inferiour to the former*)
Of Delineating any *FORTIFICATION*,
By the INTERIOR POLIGONE *given.*

Let the *Interior Poligone* given be (AC) in the oppoſite ſuperficies of a *Medall* or (DFNV) in the adjoyning *Figure*.

Having delineated a *Fortification* inwards, and thereby gotten the ſecond *Interior poligone* according to the fore-going Direction, *Page* 2. continue the Diſtance BE to a ſufficient length: For as the length of AC in any number of Parts, is to the Diſtance BE, ſo is the length of DF (being divided into the ſame number of Parts) to the Diſtance EG. Then draw a Line XY through the Point G parallel to DF, which Line XY is the true *Baſe*, upon which is to be erected a *Fortification* by the Directions of *Pag.* 1. And this Method being continued from each reſpective *Poligone* given, the *Fortification* becomes perfectly *delineated*. For as HK, is to IL; ſo is FN, to MO. And ſo likewiſe as PR, to QS; ſo is NV, to TW. Than which nothing can be more evident, as to the matter of truth and demonſtration; or more expeditious, as to the reall practice and performance.

A CAVEAT *to the* READER.

But to prevent any miſtake, which ſome perſons, either out of ignorance, or inadvertency, may run into, it will be convenient, to let the Reader underſtand, That although in *Fig.* C, *Pag.* 3. the middle *Baſe* (or *Poligone*) AA, is much longer than that on the left hand, and almoſt double to that on the right, that ſo it might appear to the eye to be ſufficiently *Irregular*, and alſo that it might reſemble the *Fortification* in *Fig.* E, where, without ſuch an inequality of *Baſes*, the Method of one *Face* cutting another, could not be ſo plainly expreſs'd, or ſo clearly diſcerned. (Otherwiſe it had been more eaſie to have made all the *Baſes* equal within that very ſame *Figure* C, than it was to make them ſo in this oppoſite *Figure* F.) Yet notwithſtanding this new Method takes it for granted, That all who pretend to make uſe of it, be ſo farr inſtructed in the firſt Principles of *Fortification*, as to know, That when ever an *Exterior Poligone*, or rather a Ground-Plot, is given them, they are ſo to deſign and contrive it, That, if poſſible, all the *Baſes* (if not the *Angles*) may be equall, That ſo there may be a perfect Harmony and Symmetry in all the parts thereof. This new *Rule* does likewiſe ſuppoſe, that he already knows, That, if it be practicable, each of his reſpective *Baſes* (or *Exterior Poligones*) ought to be about 1150. Feet; but never leſs than 1024. nor yet more than 1280. That ſo the *Lines of Defence* may not be too ſhort on the one hand, nor exceed the Port of a *Muſquet* on the other. As likewiſe, that the *Angle* of his *Baſtions* be in no caſe whatſoever leſs than 60 *Degrees*. But now, where either the Situation of a Place, or the old Walls or Ramparts of a Town, or City, admit not any ſuch equality, either of *Baſes*, or *Angles*, there the *Hercotectonick* Laws do permit the *Engineer*, either to open, or ſharpen his *Angles*, or elſe to lengthen, or ſhorten his *Lines*, as he ſhall find it neceſſary.

BRITISH
MUSEUM